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EXAMINER	
STAICOVICI, STEFAN	

ART UNIT	PAPER NUMBER
1732	

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/782,612	HINZ, BERNHARD	
	Examiner	Art Unit	
	Stefan Staicovici	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *56-110* is/are pending in the application.

4a) Of the above claim(s) *99-110* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56-98* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/21/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicants' amendment filed January 21, 2004 has been entered. Claims 56, 58-59, 66, 75, 79-80, 84, 88-89 and 98 have been amended. Claims 1-55 have been canceled. No new claims have been added. Claims 56-110 are pending in the instant application.

Election/Restrictions

2. Applicant's election of Group I, claims 56-98, is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Claims 99-110 remain withdrawn as drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 56-57, 62, 68, 86, 93 and 97 are rejected under 35 U.S.C. 102(b) as being anticipated by Livesay *et al.* (US Patent No. 5,837,185).

Livesay *et al.* (185) teach the claimed molding process of a fiber reinforced article including, positioning a fiber preform (semi-finished fiber article) in a mold, placing a vacuum sheet over said fiber preform and sealing said vacuum sheet to said mold to form a vacuum envelope, drawing a vacuum of 28 in. Hg onto said vacuum envelope, infusing resin into fiber preform and curing said resin to form said fiber reinforced article (see col. 6, lines 33-60 and col. 7, line 34 through col. 8, line 8). Further, Livesay *et al.* (185) teach reducing the vacuum to 15 in. Hg to prevent boiling of the resin as the temperature increases during the curing phase (boiling curve is not exceeded) (see col. 7, line 66 through col. 8, line 4). Furthermore, Livesay *et al.* (185) teach a molding temperature of 200-340 °F, hence it is submitted that the temperature is also controlled in order to provide an adequate level of curing (see col. 4, line 50). It is submitted that because Livesay *et al.* (185) teach applying a vacuum of 28 in. Hg during impregnation of said resin and, a vacuum of 15 in. Hg during curing of said resin to prevent resin boiling, that prevention of resin boiling occurs also at 28 in. Hg because resin impregnation occurs at room temperature.

Regarding claim 57, although Livesay *et al.* (185) does not teach a vacuum pump, it is submitted that because a vacuum exists that a vacuum pump is being used to generate said vacuum.

In regard to claim 62, Livesay *et al.* (185) teach positioning a fiber preform (semi-finished fiber article) in a mold (see col. 7, lines 34-36).

Specifically regarding claim 68, Further, Livesay *et al.* (185) teach reducing the vacuum to 15 in. Hg to prevent boiling of the resin as the temperature increases during the curing phase (see col. 7, line 66 through col. 8, line 4).

Regarding claims 86 and 93, because Livesay *et al.* (185) teach a vacuum envelope formed by a vacuum bag and a mold (see col. 3, lines 40-45), it is submitted that a vacuum port and a vacuum are present in order to form a seal with a mold such that the invention of Livesay *et al.* (185) to function as described.

In regard to claim 97, Livesay *et al.* (185) teach an epoxy resin (polyaddition resin) (see col. 4, line 46).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 56-58, 62-63, 65-74, 77-78, 86-88, 90, 93-94, 97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185).

Palmer *et al.* ('013) teach the basic claimed process of molding a fiber reinforced article including, positioning a fiber preform (semi-finished fiber article) in a mold, placing a vacuum sheet over said fiber preform and sealing said vacuum sheet to said mold to form a vacuum

envelope, drawing a vacuum onto said vacuum envelope, infusing resin into fiber preform and curing said resin to form said fiber reinforced article (see Abstract). Further, Palmer *et al.* ('013) teach controlling the temperature of said mold (200-250 °F) in order to maintain the viscosity of said resin (see col. 13, lines 38-41). Furthermore, Palmer *et al.* ('013) specifically teach that the temperature and time should be thus controlled such that bubbles are not formed during the curing cycle (see col. 8, lines 21-27).

Regarding claim 56, Palmer *et al.* ('013) does not teach controlling the vacuum pressure such that boiling does not occur (boiling curve is not exceeded). Livesay *et al.* (185) teach the a molding process of a fiber reinforced article including, positioning a fiber preform (semi-finished fiber article) in a mold, placing a vacuum sheet over said fiber preform and sealing said vacuum sheet to said mold to form a vacuum envelope, drawing a vacuum of 28 in. Hg onto said vacuum envelope, infusing resin into fiber preform under said vacuum of 28 in. Hg and curing said resin to form said fiber reinforced article (see col. 6, lines 33-60 and col. 7, line 34 through col. 8, line 8). Further, Livesay *et al.* (185) teach reducing the vacuum to 15 in. Hg to prevent boiling of the resin as the temperature increases during the curing phase (boiling curve is not exceeded) (see col. 7, line 66 through col. 8, line 4). Furthermore, Livesay *et al.* (185) teach a molding temperature of 200-340 °F, hence it is submitted that the temperature is also controlled (see col. 4, line 50). It is noted that because Livesay *et al.* (185) teach applying a vacuum of 28 in. Hg during impregnation of said resin and, a vacuum of 15 in. Hg during curing of said resin to prevent resin boiling, that prevention of resin boiling occurs also at 28 in. Hg because resin impregnation occurs at room temperature.

Therefore, it would have been obvious for one of ordinary skill in the art to have controlled the vacuum pressure as taught by Livesay *et al.* (185) in the process of Palmer *et al.* ('013) because, Livesay *et al.* (185) specifically teach that boiling of the resin is thus prevented, hence providing for an improved molded article due to a reduction in porosity and also because Palmer *et al.* ('013) teach the desirability of avoiding bubbles (see col. 8, lines 21-27).

In regard to claims 57 and 86, although Palmer *et al.* ('013) does not teach a vacuum pump, it is submitted that because a vacuum outlet (28) exists then a vacuum pump is being used to generate said vacuum.

Specifically regarding claim 58, Palmer *et al.* ('013) a porous film (18) positioned over a dry fibrous preform (16), said porous film (18) allowing resin to pass therethrough and impregnate said dry fibrous preform (16) (see col. 7,lines 1-10).

Regarding claim 62, Palmer *et al.* ('013) teach positioning a fiber preform (semi-finished fiber article) in a mold (12) (see Figure 1).

In regard to claims 63 and 65, Palmer *et al.* ('013) teach controlling the temperature of said mold (200-250 ^{o}F) in order to maintain the viscosity of said resin (see col. 13, lines 38-41). Further, Palmer *et al.* ('013) specifically teach that the temperature and time should be thus controlled such that bubbles are not formed during the curing cycle (see col. 8, lines 21-27), hence suggesting controlling the temperature of said mold. Furthermore, Palmer *et al.* ('013) specifically teach a self-heated mold tool (see col. 16, lines 31-32).

Specifically regarding claim 66, Palmer *et al.* ('013) teach a desired temperature range to obtain a desired viscosity such that uniform resin impregnation of skins (168) and (170) (see col.

13, lines 35-41) occurs. It is submitted that a uniform resin front is obtainable in order to obtain uniform resin impregnation as described by Palmer *et al.* ('013).

Regarding claim 67, Palmer *et al.* ('013) a resin viscosity of less than 1000 cPs (see col. 15, line 44). Livesay *et al.* (185) teach a resin viscosity range from 100 cPs to 1000 cPs (100-1000 mPa-s). Therefore, it would have been obvious for one of ordinary skill to have used a resin having a viscosity ranging from 100 cPs to 1000 cPs (100-1000 mPa-s) as taught by Livesay *et al.* (185) in the process of Palmer *et al.* ('013) because Palmer *et al.* ('013) specifically teach an epoxy resin (see col. 8, line 4), whereas Livesay *et al.* (185) teach that the optimum resin viscosity for an epoxy ranges from 100 cPs to 1000 cPs (100-1000 mPa-s) and also because, both references teach similar materials and processes.

In regard to claim 68, Livesay *et al.* (185) teach reducing the vacuum to 15 in. Hg to prevent boiling of the resin as the temperature increases during the curing phase (see col. 7, line 66 through col. 8, line 4) from a value of 28 in. Hg during the injection phase. Therefore, it would have been obvious for one of ordinary skill in the art to have reduced the vacuum pressure (increase the absolute pressure) as taught by Livesay *et al.* (185) in the process of Palmer *et al.* ('013) because, Livesay *et al.* (185) specifically teach that boiling of the resin is thus prevented, hence providing for an improved molded article due to a reduction in porosity and also because Palmer *et al.* ('013) teach the desirability of avoiding bubbles (see col. 8, lines 21-27).

Specifically regarding claims 69-72, Palmer *et al.* ('013) teach an impregnation (injection) temperature of 250 ^{o}F (see col. 14, line 49) and a curing temperature of 350 ^{o}F (see col. 15 lines 8-12).

Regarding claims 73-74, Palmer *et al.* ('013) teach controlling the resin system by controlling the catalyst and temperature in order to obtain a processing time (gelling time) range corresponding to the size of the part being molded (see col. 9, lines 7-12, 18-23 and 28-33).

In regard to claims 77-78, Palmer *et al.* ('013) teach the use of a micro-porous ceramic filter (134) that is positioned near or in the vacuum line (136) and that permits gas to pass, but not liquid resin, hence acting as a resin trap (see col. 11, lines 48-68).

Specifically regarding claim 87, Palmer *et al.* ('013) teach positioning a vacuum outlet (28) at a position farthest from an infusion inlet (26) such that said vacuum outlet (28) is in an area last reached by the resin flow front (see Figure 1).

Regarding claim 88, Palmer *et al.* ('013) teach the use of a micro-porous ceramic filter (134) that is positioned near or in the vacuum line (136) (vacuum port) and that permits gas to pass, but not liquid resin, hence acting as a resin trap (see col. 11, lines 48-68 and Figure 8).

In regard to claim 90, although Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not specifically teach that a connection between a vacuum port and a vacuum foil is sealed, it is submitted that said connection must be sealed in order for a vacuum to exist within a vacuum envelope formed by said vacuum foil. Specifically, in Palmer *et al.* ('013) the vacuum outlet (28) must be sealed to the vacuum bag (40) in order for a vacuum to exist within the vacuum bag and as such, allow the resin to flow as described by the process of Palmer *et al.* ('013).

Specifically regarding claim 93, Palmer *et al.* ('013) teach a distribution plate (240) that is sealed using seals (252) from a vacuum port (264) (see Figure 12 and col. 15, line 49 through col. 16, line 6).

Regarding claim 94, Palmer *et al.* ('013) teach resin brake extensions (22, 24) that absorb extra resin (see Figure 1 and col. 7, lines 23-32). Further, Palmer *et al.* ('013) teach the use of pads positioned at the edges (51, 52) of the fiber reinforcement (16) (see col. 9, lines 14-18).

In regard to claim 97, Palmer *et al.* ('013) teach an epoxy resin (polyaddition resin) (see col. 8, line 4).

7. Claims 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of King *et al.* (US Patent No. 5,528,155).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claims 59-60, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach a pressure sensor in operative contact with the distribution fabric. King *et al.* ('155) teach the use of sensors in operative contact with a fiber-reinforced composite that measure the pressure of the resin (see Abstract and, col. 4, lines 9-11 and col. 17, lines 28-36). It is submitted that because said sensors are in contact with said fabric that said sensors are also in contact with said distribution fabric. Therefore, it would have been obvious for one of ordinary skill in the art to have provided pressure sensor in operative contact with the distribution fabric as taught by King *et al.* ('155) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, King *et al.* ('155) specifically teach that such sensors improve process control of the curing process and as such, provide for an improved molded article.

8. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of FR 2 771 960.

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 64, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach a plurality of temperature sensors positioned at the vacuum foil. FR 2 771 960 teaches the use of a plurality of temperature sensors positioned onto a mold (vacuum foil) (see Abstract). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a plurality of temperature sensors positioned onto a mold (vacuum foil) as taught by FR 2 771 960 in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, FR 2 771 960 specifically teaches that such a system allows for improved process control, hence providing manufacturing information and improving the quality of the resulting molded product.

9. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Walsh (US Patent No. 5,210,499).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 75, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach process monitoring including resin infiltration and resin curing. Walsh ('499) teaches a process for monitoring resin flow (infiltration) and curing including, placing a plurality of wires onto a

fiber reinforced composite preform and monitoring resin flow and curing (see col. 4, lines 9-25). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a system to monitor resin flow (infiltration) and curing as taught by Walsh ('499) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Walsh ('499) specifically teaches that such a system allows for improved process control, hence providing manufacturing information and improving the quality of the resulting molded product (see col. 4, lines 52-55).

10. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Holtzberg (US Patent No. 5,849,229).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 76, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach pre-aging the resin. Holtzberg ('229) teaches a molding process including, pre-aging the resin prior to molding in order to increase its viscosity and reduce processing time (see col. 5, lines 54-67). Therefore, it would have been obvious for one of ordinary skill in the art to have pre-aged the resin as taught by Holtzberg ('229) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Holtzberg ('229) specifically teaches that pre-aging of the resin prior to molding allows for a reduction in processing time and also increases process efficiency by employing the exothermic heat of the resin reaction.

11. Claim 79 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Russell (US Patent No. 4,201,823).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 79, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach an extraction chamber. Russell ('823) teaches a vacuum molding process including, providing an extraction chamber (29) connected to vacuum conduits (30, 31). It would have been obvious for one of ordinary skill in the art to have provided an extraction chamber as taught by Russell ('823) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Russell ('823) specifically teaches that such an impregnation system allows for an uniform pressure to be applied which allows for an improved molded product to be obtained (see col. 9, lines 31-60).

12. Claim 95 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Wejrock *et al.* (US Patent No. 5,256,366).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 95, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach a first and a second vacuum connection. Wejrock *et al.* ('366) teach a vacuum molding process including a resin brake (8, 26) located between a first vacuum connection (6) and a second vacuum connection (22). Further, it should be noted that Wejrock *et al.* ('366) teach a resin

spillway (8) that also acts as a resin brake (see col. 2, lines 52-60 and, col. 3, lines 27-35 and 54-65). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a resin brake located between a first vacuum connection and a second vacuum connection as taught by Wejrock *et al.* ('366) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Wejrock *et al.* ('366) specifically teaches that such an arrangement allows for a separate seal to form between the impregnation vacuum and the sealing vacuum systems, hence providing for a more uniform flow and a such, an improved molded article (see col. 1, lines 27-39).

13. Claim 96 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Brown (H465).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 96, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach ultrasonic monitoring of the molding process. Brown (H465) teaches the use of ultrasonics to monitor resin curing during molding of fiber–reinforced composite sheets (see Abstract). Therefore, it would have been obvious for one of ordinary skill in the art to have provided an ultrasonic monitoring system as taught by Brown (H465) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Brown (H465) specifically teaches that such a system allows for an improved nondestructive method for in-process testing of composite materials, hence, providing for improved process control and as such an improved molded article.

14. Claim 98 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Livesay *et al.* (US Patent No. 5,837,185) and in further view of Tunis, III et al. (US Patent No. 6,159,414).

Palmer *et al.* ('013) in view of Livesay *et al.* (185) teach the basic claimed process as described above.

Regarding claim 98, although Palmer *et al.* ('013) teach optimizing the resin flow, Palmer *et al.* ('013) in view of Livesay *et al.* (185) do not teach controlling the flow rate. Tunis, III et al. ('414) teach a molding process, including providing a core having longitudinal and transversal channels and by optimizing the dimensions of said longitudinal and transversal channels the flow rate is optimized such that uniform impregnation occurs (see col. 5, lines 24-60). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a core having longitudinal and transversal channels in order to control resin flow rate as taught by Tunis, III et al. ('414) in the process of Palmer *et al.* ('013) in view of Livesay *et al.* (185) because, Tunis, III et al. ('414) specifically teach that such a core allows flow rate to be optimized, hence obtaining uniform resin impregnation and as such an improved molded article.

Allowable Subject Matter

15. Claims 61 and 80-83 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. Claims 84-85, 89 and 91-92 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

17. Applicants' remarks filed January 21, 2004 have been considered.

Applicants argue that "Livesay does not disclose or remotely suggest that vacuum pressure and temperature are controlled together" (see page 18 of the amendment filed January 21, 2004). In response, it is noted that Livesay *et al.* (185) teach controlling the vacuum during impregnation and curing and, also teach controlling the temperature in the range of 200-340 ^{o}F, hence it is submitted that both the vacuum and the temperature levels are controlled.

Applicants argue that "Livesay is not directed towards the use of heat curing" (see page 18 of the amendment filed January 21, 2004). In response, it is noted that Livesay *et al.* (185) teach radiation curing that in turn results in heat due to an exothermic reaction which in turn generates heat curing.

Applicants argue that "in Livesay, only after resin infiltration is the vacuum pressure adjusted such that boiling occurs" (see page 18 of the amendment filed January 21, 2004). In response, it is noted that Livesay *et al.* (185) teach applying a vacuum of 28 in. Hg during impregnation and a vacuum of 15 in. Hg during curing of said resin in order to prevent boiling of the resin. It is submitted that the 28 in. Hg vacuum level is adequate to prevent boiling of the resin because impregnation occurs at room temperature.

Applicants argue that "combining the disclosure of Palmer and Livesay...would not lead one skilled in the art to the present invention, since neither Palmer nor Livesay disclose that vacuum pressure is controlled together with temperature such that during application of the liquid resin including during resin infiltration and curing, the boiling point curve of the resin is not exceeded" (see page 20 of the amendment filed January 21, 2004). In response, it is noted that:

(a) Palmer *et al.* ('013) teach a vacuum-assisted process including degassing of resin and, resin impregnation and curing under vacuum. Further, Palmer *et al.* ('013) teach controlling the mold temperature to maintain the viscosity of said resin and that the *temperature* and time (emphasis added) should be controlled such that bubbles are not formed during the curing cycle (see col. 8, lines 21-27).

(b) Livesay *et al.* (185) teach a vacuum-assisted molding process including, infusing resin into a fiber preform under a vacuum of 28 in. Hg and curing said resin under a vacuum of 15 in. Hg to form a fiber reinforced article. It is noted that because Livesay *et al.* (185) teach applying a vacuum of 28 in. Hg during impregnation of said resin and, a vacuum of 15 in. Hg during curing of said resin to prevent resin boiling, that prevention of resin boiling occurs also at 28 in. Hg because resin impregnation occurs at room temperature.

(c) Therefore, it would have been obvious for one of ordinary skill in the art to have controlled the vacuum pressure as taught by Livesay *et al.* (185) in the process of Palmer *et al.* ('013) because, Livesay *et al.* (185) specifically teach that boiling of the resin is thus prevented, hence providing for an improved molded article due to a reduction in porosity and also because

Palmer *et al.* ('013) teach the desirability of avoiding bubbles (see col. 8, lines 21-27). Further, it should be noted that under MPEP §2144, it "is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972).

Applicants argue that "a reduction in vacuum pressure means that the pressure is raised" (see page 20 of the amendment filed January 21, 2004). In response, it is noted that when vacuum pressure is reduced the absolute pressure is increased as taught by Livesay *et al.* (185).

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (571) 272-1208. The examiner can normally be reached on Monday-Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael P. Colaianni, can be reached on (571) 272-1196. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stefan Staicovici, PhD

Primary Examiner 4/19/04

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April 19, 2004